

National Aeronautics and Space Administration

Office of Education

Education Advisory Committee Meeting

February 18-19, 2004

NASA Headquarters

Washington, D.C.

MEETING REPORT

Dr. William Harvey
Chair, Education Advisory Committee

Dr. Katie Blanding
Executive Secretary

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*Meeting Report Prepared by Linda D. Voss,
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EDUCATION ADVISORY COMMITTEE MEETING MINUTES

Wednesday, February 18

Welcoming Remarks

Dr. Adena Williams Loston, Associate Administrator for Education

Dr. Adena Loston welcomed the committee members to the inauguration of the Education Advisory Committee (EAC) and introduced committee chair Dr. William Harvey and NASA Deputy Administrator Fred Gregory for direction, focus, and the Agency perspective.

Mr. Fred Gregory

Former astronaut and number two person at NASA, Mr. Fred Gregory came from a family of educators, including his uncle Dr. Charles Drew. He talked about his appreciation for teachers and the change in the status of the teaching profession. He explained his belief in passing on more to the next generation than his generation received. For him, the bar was always rising. There was no status quo, but a daily challenge.

Consolidating educational activities into the Education Enterprise was a bold step for NASA that put education at the same level as space flight at the Agency. "Inspire the next generation" is an agency-level goal and mission statement. Education is not being emphasized in isolation any more than the exploration of the Moon and Mars is in isolation. NASA investigates the Moon, Mars, and beyond to determine whether humans are alone in the Universe. NASA works with teachers to inspire students to explore even further.

It is an exciting time with Spirit and Opportunity on Mars and the discovery of bedrock at Opportunity's landing. Mr. Gregory mentioned the Spitzer Space Telescope, its infrared sensor, the impact of adding infrared onto visual imagery, and the amount of imagery from Spirit alone outlasting their lifetimes. The James Webb Space Telescope will come online at the end of the decade. The knowledge gain is unprecedented and will be transcribed into textbooks.

He talked about his experience seeing space from the shuttle orbiter. He characterized people as either an Earth person, looking down at the dirt, or a space person. He was a space person. He called space black velvet with diamonds throw on it. It will take an artist to communicate the overwhelming experience of looking at the Earth from space. From space, the Earth is a system of interdependent systems. The water and atmosphere are fluid. Lightening and storms generated by fast-moving cold fronts are orderly, not chaotic. There are no borders or boundaries.

He mentioned that aeronautics was separated from space in the Agency, but that aeronautics touches every day aspects of people's lives. NASA is working closely with the National Oceanic and Atmospheric Administration (NOAA) on better weather forecasting to improve airline flights and air traffic control. So NASA is working not only on space issues, but other issues that affect people daily.

He was originally loaned to NASA in 1974 from the Air Force and never left. He couldn't imagine working anywhere else that would be as exciting.

He raised the issue of the country not meeting its needs in science and engineering as documented in the Hart-Rudman *National Security Report*. The math, science, and literacy levels must be raised throughout society, not in isolation. Education is the link between the work being done in the Agency and the ability to transmit that to the next generation.

He charged the committee with getting excited about NASA's mission. He invited the committee to tell NASA what they are doing right or wrong and how they can improve. He encouraged ideas on how NASA can link with others' efforts, such as the National Science Foundation (NSF). It is the obligation of this generation to produce the next and following generations of scholars and risk takers to carry the country through the 21st Century. When history is written, it will look back on what this generation provided that was noteworthy. NASA Administrator Sean O'Keefe

asked Mr. Gregory to pass on his thanks to the committee members. Mr. Gregory anticipated passionate discussion and a contribution to prepare the next generation for an exciting future.

Dr. William Harvey

Dr. William Harvey opened the meeting reiterating the sense of the opportunity and challenge presented by Mr. Gregory. The committee had a full agenda of presentations to give a better understanding of the Agency. He asked the committee members to introduce themselves around the table.

Federal Advisory Committee Act and Ethics

Federal Advisory Committee Act

Andrew Falcon, Office of the General Counsel

Although specializing in ethics rules, Mr. Andrew Falcon presented the Federal Advisory Committee Act (FACA) concept to the committee. The act was designed by Congress to guide advisory committees in providing to the Government advice that is relevant, objective, and open to the public. A FACA advisory committee can be established by statute, the President, or the head of an agency. The committee has to contain at least one non-federal employee and can not cover operational activities. Committees have charters that set out the scope of the committee's work and have a maximum duration of two years unless renewed.

Mr. Falcon reviewed the requirements of a FACA committee and its characteristics. While the intent was to get a fairly balanced point of view, the committee viewpoints could be diverse but still aligned with the purpose of the committee. With the idea that sunshine is the best disinfectant, FACA meetings are intended to be open and accessible to the public to insure that decisions are being made on the merit of the facts. Open meetings improve public confidence in decision making. Public access to the meetings is assured through advance notice. Exceptions to public FACA meetings include administrative meetings (such as report drafting) and fact finding or research. NASA cannot use the committee's recommendations unless the committee meets the FACA requirements.

Materials from the meeting include the minutes, and extensive personal notes by committee members become part of the federal record that can be used to research the genesis of policies.

Ethics Briefing for Special Government Employees

Serving on NASA Advisory Committees

Andrew Falcon, Office of the General Counsel

Public service is a public trust. Ethics rules are in place to make sure decisions of advisory committees are based on merit, and there are no conflicting financial interests and no improper use of nonpublic information. Special Government Employees (SGE) are only described under "bribery, graft and corruption," so they are subject to ethics rules as well as Government employees. SGE is a temporary appointment with or without compensation for 130-365 days. It is considered an "inside" job and subject to post-employment rules.

The two parts to the ethics rules govern actions while serving as a committee member and actions in life outside the committee. The object is to avoid even the appearance of impropriety.

Sections 203 and 205 govern actions outside the committee membership. They only apply to contracts and grants members are "personally and substantially involved in" and prohibit members from representing their sponsoring organization in front of NASA on a matter discussed in committee.

Section 208 prohibits members from participating in committee work that will substantially benefit their or their organization's interests. In case of conflicts of interest, talk to the committee executive secretary to resolve them before conflicts happen. Transmitting grants, signing grants, doing things with or for NASA is not a problem as long as it is not related to something the committee is discussing. Activities discussed in committee that become an activity a member is engaged in do not count because it would be speculative whether the preceding action influenced self interest down the road. "If in doubt, walk out." When financial conflicts are involved, committee

members have the option of reclusing themselves from participating in the discussion. This pertains to discussion that has a "direct and predictable effect" on imputed financial interest. Listening to a discussion about recommending additional money to an existing program is not a substantial discussion.

He gave the legal office, the Education Enterprise leadership, and the committee's executive secretary as points of contact should an issue come up. His contact information was:

R. Andrew Falcon
202-358-2082

In answer to a question about President Bush's Executive Order setting goals to better serve tribal, black, and Hispanic serving institutions, Mr. Falcon replied that he would have to look at the committee charter to see whether that was a duty of the committee.

NASA's Education Enterprise

Dr. Adena Williams Loston, Associate Administrator for Education

Dr. Loston wanted to reemphasize Fred Gregory's point that the committee was the right mix of individuals to write and charter history in the Education Enterprise. She welcomed and appreciated the committee's efforts in charting a new course. She reviewed the Agency's organizational chart and the functional and Enterprise offices. Since the President's announcement of the new space initiative January 14, NASA now has an Enterprise that is newer than the Education Enterprise (Code N), the Exploration Enterprise (Code T)

NASA is organized strategically around themes. There are ten agency-level thematic goals, two of which are specific to education. Those are Theme 6 to inspire and motivate students and Theme 7 to engage the public, which is shared with the Public Affairs Office (PAO). The Agency has a Strategic Plan, the Enterprises each have a Strategy, and Centers have Implementation Plans. (The Enterprise Strategy was in the front pocket of the notebook of materials.)

Dr. Loston gave the committee three charges:

- Review the Education Enterprise Strategy and advise the Enterprise on their future direction.
- Contribute ideas to the Enterprise's mandate to increase the number of students in math, science, and engineering to directly impact the workforce.
- Assess how well the Enterprise is responding to the Agency's Strategy Plan and the President's new vision.

She reviewed the organization and history of the establishment of the Education Enterprise. Each Enterprise has an education lead who reports to Education Deputy Associate Administrator Dr. Clifford Houston. Also, all ten NASA Centers have education directors for Center-specific programs.

Within the Education Enterprise, there are three directorates plus Minority University Programs:

- Dr. Bernice Alston, Elementary and Secondary Education Division
- Mr. James Stofan, Informal Education Division
- Dr. Brad Weiner, Higher Education Division
- Dr. Carl Person (acting), Minority University Programs.

In addition, Dr. Shelley Canright is in charge of the Technology & Products Office for making educational products available. She has received a number of Emmy's and other (i.e., New York Film Festival) awards for her work and is the brains behind the NASA Portal website.

To inspire the next generation of explorers and make a difference in the Nation's classrooms are the ties that bind the Education Enterprise together.

Dr. Loston's job is to be the voice of education for NASA. In light of the President's new vision and mission statement for NASA, NASA has realigned Enterprises to emphasize exploration. In addition, Pete Aldridge is leading a Presidential Commission on Implementation of U.S. Space Exploration policy.

The Education Enterprise Strategy is being reevaluated and refocused to support the exploration vision. The Education Enterprise partners with other Enterprises to ensure that NASA's education theme is embedded in their activities.

Dr. Loston reviewed the budget, which is flat except for congressional earmarks, and the Education Enterprise's Pathfinder initiatives. Other Enterprises manage \$70 million that is used for education, which is not reflected in Code N's budget. The Minority University Program received a two percent budget increase in response to the President's Executive Order. Code N is shifting to managing the portfolio more than individual programs. They are considering going to a peer review process to evaluate programs with a more competitive process for allocating dollars to programs.

Questions addressed whether there was a database to track investment from other Enterprises, whether they were accountable for earmarks, how much guidance and oversight they have over the other Enterprises' education activities. Dr. Loston responded that they have been directed by the Office of Management and the Budget (OMB) to develop a database that tracks all the education money. They have to report back to OMB in February. Dr. Brad Weiner, Higher Education Division Director, commented that the congressionally directed money generally goes to museums and science centers around the country. In higher education, earmarks generally plus up existing programs. Code N works to make sure the directed money is used to advantage. The earmarks are only for one year. The Minority University money is tracked separately, though it is part of Code N's budget. Dr. Clifford provides oversight on other Enterprises' education programs. They are considering evaluating programs funded by congressionally directed money as well.

Under the new workforce investment act from Congress, they work with the Office of Equal Opportunity and Human Resources on the Agency's recruitment strategy to increase the supply and diversity of science, technology, engineering, and math (STEM) graduates.

They also partner with other agencies that have education written into their mission statements: the Department of Education (DOE), National Institutes of Health (NIH), and NSF. They have weekly meetings with DOE and NSF.

Dr. Loston discussed the operating principles on which the education programs are evaluated:

- customer focused
- content relevant to NASA
- attracting diversity to pipeline in STEM
- target diverse groups
- evaluation (do a great job at self-assessment, but need measurable outcomes)
- partnerships/sustainability anchored in the community so programs don't go away when the NASA money does.

The four new Code N initiatives are:

- The Educator Astronaut program
- NASA Explorer Schools
- NASA Explorer Institutes (museums, science centers, community-based organizations)
- NASA Science & Technology Scholarship Program

Starting two years ago, \$13.7 million was invested in NASA Explorer Schools. Code N is also partnering with educational textbook publisher Scott Foresman on a space exploration chapter.

The physical assets of Code N's Public Outreach include:

- NASA field centers
- The educator resource center network
- The space science support network
- The space grant consortium network

Public Affairs/Education Outreach

Ms. Gretchen Cook-Anderson, Senior Public Affairs Officer

Public Affairs participates in agency Goal 7 to engage the public. The public affairs component of Code N interfaces between the Agency and the media, coordinates events, sends notes to editors, develops articles for publications, and reviews speeches on behalf of the Education Enterprise on a national level. They coordinate with NASA field centers to try to act as one Agency.

They have an objective of increasing the awareness of NASA's content, resources, and opportunities in targeted audiences through events, public appearances, the NASA Portal (www.nasa.gov), NASA TV, email listservs for educational communities, and proactive media outreach. The NASA Portal has a section for educators. Ms. Cook-Anderson's contact information is on the website as well. Their primary audience is educators. Secondary audiences are students, parents and families, and science education leaders or influencers.

They are working to try to communicate the message of the President's new vision, which is that NASA is about Americans' destiny as Explorers, not a destination. The secondary messages are:

2. Mars, Earth, Moon: One stepping stone at a time.
3. Space impacts our lives.
4. People and machines need each other in space.

She provided the committee with copies of the PAO's video on the new vision.

Mr. King recalled something that had been said to him: that this generation could be called the Mars generation. Today's 10 or 11 year old will probably be the first human being on Mars.

Overview of Education Program

Dr. Clifford Houston, Deputy Associate Administrator for Education Programs

Dr. Houston's two priorities are workforce development and supplying the educational pipeline. More people of color and women will be included in the future. They have a goal of including people under-represented in the workforce.

Elementary and Secondary Education

Dr. Bernice Alston, Director

Their objective is to increase the number of students and teachers involved in NASA education opportunities. They measure by four strategic outcomes:

- student participation
- educator support
- family support
- institutional/systemic support

She highlighted programs targeted for these audiences--workshops, summer internships, and technological avenues through the website. The website allows families to have common experiences, by sitting down together at the computer. They encourage inquiry teaching in classrooms. Teachers move into why, not what. They sponsor team meetings for teacher professional development. They share the Educator Astronaut Program knowledge with teachers and students

- Summer High School Apprenticeship Research Program (SHARP)--Over 5,800 students conduct research, publish results, and develop websites.
- Aerospace Education Services Program (AESP)—This program is characterized by state and standards based programming for customized Professional Development (PD) and informal education. The object is job-embedded and sustained PD.
- Science, Engineering, Mathematics, and Aerospace Academy (SEMAA)—This program supports families. The object is to increase enrollment in college preparatory math and science courses. It attempts to engage students, teachers, and parents in emerging technologies.

- NASA Opportunities for Visionary Academics (NOVA)—Lead universities create change in higher education to enhance STEM literacy for teachers.

Their flagship Pathfinder Programs are the Educator Astronaut Program and the Explorer Schools program. Educator astronauts will help connect space exploration to the classroom. They want to recruit three to six outstanding educators into the astronaut corps. Barbara Morgan is still scheduled to be the first educator astronaut. She will fly after the shuttle return to flight. They have identified finalists in the educator astronaut competition. They have not been announced yet, because they had to go back to the candidates after the announcement of the President's vision to ask them if they were willing to go on a longer flight than they had signed up for. NASA has different levels of engagement with different levels of the astronaut educator candidates. They view the 36 candidates that went to the Johnson Space Center (JSC) to interview as champions for STEM education.

The Explorer Schools selected are struggling schools. They are not used to PD, travel, support, or resources. The NASA grant is for a 3-year partnership for grades 4-9 with school teams from diverse populations. NASA did an individual needs assessment for each school. Some of the schools are Title One schools—38 of 50 are in high poverty areas. Selection was based on the schools presenting a compelling rationale for why they would want to be engaged with NASA. These schools have a high percent of under-represented individuals. The proposals had to include a school administrator and state math or science supervisor for sustainability. In answer to the extent to which they try to engage universities to partner with Explorer Schools, Dr. Alston replied that she was working with Dr. Brad Weiner to see how their programs could interface in the K-16 continuum.

In answer to how they got the word out, Dr. Loston said they worked through associations like the National Science Teachers Association. NASA Centers advertised and recruited in their states. They talked to superintendents when she traveled to New York. It is on the education page of the NASA Portal. She would like to engage the committee in helping them get the message out on education.

Committee members asked about benchmarks for numbers NASA wanted to increase. They are doubling the number of Explorer Schools. The Earth crew website has engaged a whole new community of learners and students learning more about NASA. The Earth crew website has 8,000 members so far. It provides an ongoing relationship between NASA and adult-led groups of students. Their benchmark is a 20 percent increase in each outcome area.

Higher Education Division

Dr. Brad Weiner, Director

Under their overarching objective of inspiring students to pursue careers in STEM, they also strive to support research capability and increase diversity. Dr. Weiner reviewed their outcomes, which including increasing underserved students by 20 percent in the next 5 years.

Dr. Weiner reviewed their awards programs funded at over \$1 million a year. They include institutional awards to support research infrastructure and capability. The Experimental Program to Stimulate Competitive Research (EPSCoR), for example, stimulates experimental research. EPSCoR awards support infrastructure, for example, \$500,000 might be used to set up a laboratory to attract a new researcher among competitive principal investigators. The research has to be needed by NASA. Awards also support clusters of investigators in relevant areas. The Principal Investigator Awards support young (often minority) faculty researchers involved in NASA research to get them into the grants process. Under the NASA Administrator's Fellowship Program, faculty can come to NASA or NASA employees can transfer to universities for very productive exchanges. The Partnership/Consortium awards provide seed research money to space grant consortia that have one lead and affiliate members. The grant includes some money for K-12 and teacher training activities, and 40 percent goes to student fellowships. The Partnership Awards for the Integration of Research into Undergraduate Education (PAIR) include curriculum improvement. Pre-college Awards for Excellence (PACE) in mathematics, science, engineering, and technology target pre-college students and teacher development. In addition, NASA grants fellowship and scholarship awards to graduate and undergraduate students for research.

Their Pathfinder Program is the Science and Technology Scholarship Program (STSP). Students get financial aid in return for working for NASA for two years for each year of funding.

Education Technology & Products**Dr. Shelley Canright, Director**

Technology is the assistant, a tool, not the driver to build learning systems that support education. Their objective is included in the Office of Science and Technology Policy (OSTP) science agenda and R&D investments to improve e-education (electronic education). They are always looking at ways to strengthen STEM education by enhancing access and availability to education programs.

They emphasize the incubation of technology and bring in science partners. They use tools integrated with curriculum and do pilot testing to effectively target learning communities. They apply the practice of customer-focused learning materials in how they disseminate and the special services of their digital learning and content services, which apply networking education applications and services.

They are working on better internal collaboration to get rid of stove pipes and hope to put together a backbone system to support the capability to serve high-profile initiatives. The system would get away from doing one-time events to building relationships.

Their creative, interactive citizen-centered services use a technology infrastructure to transport learners to a NASA environment and involve them in a personal journey of discovery. The system is designed to inform, engage and empower visitors to become active learners. Components include the NASA Portal, digital learning network, and digital TV education files. They are mindful of multiple formats for low-bandwidth communities, handicapped accessibility, and other language speakers. They designed a wireless interface and virtual touch from a sonar and translation matrix that uses audio signals to help visually impaired students "see" the space station in 3-D.

To measure the effectiveness of their content, they are working with the Explorer Schools to look at the effect of their materials in targeted learning environments. They use an independent consultant company to look at the performance of NASA materials compared with others. Everything they do is research based, which is new to some of their audience. The committee observed that comparing how their students do in English language acquisition compared with other students would be interesting.

They are trying to develop a portfolio of products so students can grow with NASA as part of their sustainability goal. With the Earth crew website, they started out with students performing missions on the website. They have moved to webcasts with adult-supervised students. They had a webcast with the NASA Administrator in October. Earth crew teams are mostly families. They are hoping to establish an education channel at some point.

Informal Education**Mr. James Stofan, Director**

Mr. Stofan defined "informal education" as providing stimulating experiences for STEM outside formal classrooms. Their objective is to increase understanding and engagement in those disciplines. They link with the formal education community and work to stimulate parents and others to support STEM learning.

Informal education is where people can smell, touch, and feel the subject. The St. Louis Science Center is an example of informal education. Their division has 2.5 people, but they collaborate with the science and technology Enterprises.

Under agency Goal 7.1, their objective is to improve public understanding and engage the public in shaping and sharing the experience of exploration and discovery. Their outcomes include tying into a national program to engage the informal education community—science museums, planetariums, after school groups, Boy Scouts, 4-H, YMCA (40 million students). Testing is not required to inspire and engage. The volunteers who help students, like Americorps, experience 60 percent turnover every year, which is a challenge.

Their Pathfinder initiative is the Explorer Institutes. This is a national program to engage the informal education community and provide resources and professional development opportunities. These institutes will be held at centers around the country. Alternatively, they will bring the audience to NASA Centers and immerse them in the sights and smells of what NASA has.

They are working on evaluation strategies. In environmental education, they looked at moving people to understanding, from awareness to action. They would like to measure how their experiences result in lifelong changes. They have yet to develop metrics and measurements to evaluate effectiveness.

NASA has the capacity to link science centers around the country using the Mars Visualization Alliance. The program started a year before the Mars rovers to see if NASA could push rover imagery out over the Internet in near real time to science centers. Museums helped the team figure out what would be needed. The program was a huge success during the Mars landings. Museums were turning people away after they filled their facilities. The science centers added to the value by creating ways to interpret events.

They are also looking at ways to open up the NASA Portal, bring information in relevant formats to informal communities, and work with the PAO office to bring outreach to the next level. They are working on how to make NASA relevant to the Rock Springs, Arkansas, natural science museum, for example.

They do not have specific programs yet, but envision a grants program for Explorer Institutes, the NAS Portal, and exhibit placement.

In answer to a question about working with the Boys and Girls clubs, NASA has pilot projects with the Boys and Girls clubs of America locally. The Jet Propulsion Laboratory (JPL) has a relationship with the Girl Scouts to bring girls to JPL to work with mentors. A Cub Scouts pilot project, Space Place, is a web-mediated program that allows den mothers to get information and training experiences online. The Education Enterprise will meet with the national leadership of these groups to see about working institution to institution to develop a national partnership and put together a national framework from these pilots.

Mr. King mentioned that his science center leverages their resources by providing tools to other people providing programs. "Lights on after school" helps parents help kids after school. He was amazed at the hunger for resources for these informal educators.

Dr. Marie McDemmond observed that churches can be important in after school programs and in basing programs in the community, which helps underserved kids. There was a question about whether there were any prohibitions on linking with church-based programs or summer camps. The climate in Washington, D.C. has changed. Faith-based activities are being interpreted more liberally. Code N is feeling their way to avoid triggering a reaction against what they are trying to do. Churches should feel welcomed in NASA's infrastructure. Connecting with churches is the right thing to do. Mr. King added that working with faith-based groups hasn't been a problem for their publicly funded science center, as long as the focus is working with kids. Marie McDemmond also mentioned bright, incarcerated 18-year-olds as an audience. Bringing learning to them is bringing them self-respect.

"Informal education" really could better be defined as "experience-based" education. Children learn more, quicker in that kind of environment.

Bonnie McClain mentioned a program in Indiana where they experimented with a voluntary summer school to see if they could make it interesting enough to get attendance. They decided to focus on the space station. The summer school was open to grades 1-8. The atmosphere was informal, which the children liked. By the end, they had no absenteeism and tested very well on the content. The parents wanted the school offered at night so they could take it.

Education Flight Projects Office **Ms. Debbie Brown Biggs**

The education folks in the Flight Projects Office handle everything education related that wants to leave the planet. They try to inspire more STEM students by providing opportunities to students to use NASA flight platforms for hands-on research. Their objective is to increase the diversity of students conducting NASA-relevant research by 10 percent. They target K-12 and higher education. They partner with all Enterprises on content. The content of the experiments they do on orbit aligns with the goals of the Enterprises as well as educators.

The flight platforms they look at for providing student research opportunities are:

- The International Space Station (ISS)
- The Space Shuttle
- Expendable Launch Vehicles (ELVs)
- Scientific balloons
- Scientific aircraft (UAVs, KC-135)
- Sounding rockets
- Amateur rockets (Wallops)

They have been able to continue to launch some ISS opportunities, three through Russia.

Their programs include:

- ❖ Live, interactive programs with the shuttle crew. Students interact with the crew. The crew provides short demonstrations on basic science principles through one-way video, two-way audio.
- ❖ Launching simple items that usually don't have power but can be videotaped.
- ❖ Amateur radio interactions with the crew once a week (audio only).
- ❖ EarthKAM camera mounted on the U.S. laboratory window for studying the surface of the Earth. Students submit research proposals. They get scheduled into a flight opportunity and request images. The camera takes pictures and downloads them to student classrooms within about 4 hours.
- ❖ Student satellite initiative. Students launch a research satellite.
- ❖ Scott Foresman textbook chapter. The publishing company contacted NASA about developing materials for Barbara Morgan's flight. They formed a partnership.

In response to a question about NASA's support of the X Prize, Ms. Biggs said they are starting with their own house. There are some commercial activities out there they might want to collaborate with, or at least not duplicate. But how they work with commercial efforts is still an open question. The commercial venture has to be strategically aligned with education goals.

Enterprise Education Leads

Office of Space Flight Education

Ms. Debbie Brown Biggs

Ms. Biggs supports the Education Enterprise and Pathfinder initiatives. The Space Flight Enterprise programs are the ISS, the shuttle, and flight support (ELVs). The Enterprise implements education programs mostly through the Centers: Johnson, Kennedy, Marshall, and Stennis.

Ms. Biggs reviewed their programs including Mississippi Blue Ribbon Schools, a partnership with federal and state departments of education to develop exemplars of curriculum development. The KC-135 student flight program brings teachers and students from Explorer Schools and informal education to perform research. They have to bring a journalist with them and take it back to the schools. Participants have to go through flight check out and physicals. The Great Moonbuggy Race is a high school engineering design project run out of Marshall. Their Pre-Service Teacher Institute provides the opportunity to look at new, alternative instruction technology and strategies for pre-service teachers at the university and college level. Their Digital Learning Network webcasts NASA facilities (full-size mockups, astronauts) from Johnson. NASAexplores is a weekly digital reader. NASA Educational Exploration Teams of students and teachers get hands-on experience with space hardware at Kennedy. The activities are tailored and inquiry-centered for families and informal groups.

Their next steps include building relationships, aligning with exemplary program criteria, and strengthening their collaboration with Code N. Ms. Senta Raizen commented on the Center-centric look of the programs. Ms. Biggs acknowledged that many of the programs are legacy Center programs, and they are trying to get more integrated.

Dr. Diana Natalicio asserted that integration was critical because people outside of NASA are confused about what NASA is doing. The Centers have to march to Headquarter's vision and priorities. Dr. Canwright noted that they collect NASA products and services and metatag them to customize them for different grade levels, topics, etc. They

are working to get evaluations out with the materials, fit materials together in a continuum, and have teachers know where to go.

Biological and Physical Research Education Program

Ms. Bonnie McClain, Chief

The Office of Biological and Physical Research (OBPR) is responsible for researching living things such as plants and people and how they respond and react to microgravity. In addition, OBPR researches physical things—materials, fluids, fire—and how they respond, react, or behave differently in microgravity. If how they respond is a bad thing, then they develop countermeasures.

A year ago, OBPR reorganized by five priority science questions. With the President's new vision, the Moon and Mars become NASA's new laboratories.

The core values of OBPR's education program are linked to real research, authentic, and relevant (makes sense to the student in their world). For them, the learner has no age boundaries and the classroom has no walls. They use research that is currently funded and real tools to get students excited about space science.

OBPR has four research divisions with an education and public outreach (E/PO) manager. Under them are people who create materials. They have eight extended research consortia. Each consortium has at least three academic partners doing educational outreach. In addition, they have 15 research partnership centers, where most of the funding comes from commercial partners.

Ms. McClain went over OBPR's outcomes and targets and some of their products and formats.

In response to a question about how much education resource resides in OBPR, Ms. McClain said OBPR spends \$1.4 million on education. Space Flight added that their amount was something like \$5.4 million.

Committee Assessment of Presentations

Dr. John Jordon was overwhelmed by the complexity of the organization and the opportunities to take advantage of things he didn't know about. He praised the personnel making things happen. He wished they could learn more about instruction of math and science from people expert in it. The states and K-12 schools could use math and science offerings, which he looks forward to selling to them.

Dr. Lee Stiff found the presentations interesting. He had some awareness of what NASA does and students that work for NASA outreach. He was ready to give advice on the issues of interest to NASA. On pipeline issues, when NASA education comes to the educators and talks about the workforce, that world may not be ready to entertain what NASA brings to it. The NASA experts, on the other hand, may not be ready to interface with the educators' world. There's more than just knowledge involved. NASA content is inherently exciting, but it has to be sustainable. Teachers and students will engage because they have success with the content they need to go into careers or areas of study. As with most marriages, marrying the world of education as it exists and NASA as it exists is complex, but not complicated. There will have to be compromises and understandings among parties. Teachers are at the forefront of implementing content and exciting young learners. They are the ones who can deliver the goods after NASA leaves. Anything an agency can do to support teachers to inspire students is exciting. Curriculum is good, but it's only as good as the teachers who implement it. If it falters, the curriculum has to be massaged, and people have to get up to speed on how to teach it. So there has to be a foundation or base of knowledge in addition to content to maintain or sustain students in the education process.

Mr. Doug King mentioned that they had advisory committees of their own. He understood it was most useful to give advice where it is most useful and requested guidance from NASA. He suggested NASA should be pushing toward more leveraged programs. NASA might consider mapping out what role they should play in education from a bigger world perspective.

In response, they went back to the three areas Dr. Loston had requested feedback on:

- Whether the Education Enterprise Strategy was anchored to the Agency Strategic Plan.
- Whether their Pathfinder initiatives were engaging the learning community.
- Whether they were responsive to the President's new vision.

The strategy document in the front pocket of the materials notebook was the first strategy for the Education Enterprise. It takes the two thematic goals to inspire students and reach the public and maps out a plan. How did they do on responding to agency goals six and seven? Is the plan a good one for getting more students in STEM?

Their four initiatives were:

- The Educator Astronaut Program.
- Explorer Schools with inquiry based instruction and teachers.
- Explorer Institutes that share NASA resources with science centers, the informal education community, families, and parents.
- Higher education science and technology scholarship for service.

Dr. Dolores Fernandez looked at the budget and commented that the Federal Government needed to put a budget behind those programs. She was concerned about juggling programs with no resources. She didn't see any hope to make a difference here at NASA with this budget.

Dr. Diana Natalicio commented on sustainability, which is what happens in the school after the teacher is left alone. How doesn't the teacher keep going without the technology? Projects are funded, then die when the funding is cut off. She was concerned about sustainability and how each one of these programs and all programs in aggregate see themselves being sustained in these schools. Scaling will be important with a limited budget that's not growing. Otherwise NASA touches a small number of kids. How does NASA touch more lives and access more people? She hadn't heard much discussion on scaling up and sustainability dimensions.

Her second point was the NSF model has a separate education and human resources directorate where the programs reside. In the NSF model, it is easy for research directorates to not take responsibility. The risk at NASA is that folks might assume that they no longer have to do education. It is an interesting problem managing those stakeholders and set of relationships. As the budget is tight, the motivation for doing education programs might diminish with the new Enterprise. Dr. Loston replied that education is core to NASA's mission. They have budget guidance language they developed that gives direction to the other components doing education saying that. Education initially got some push back about paying for some things, but they have made it clear that the other Enterprises have equal responsibility because education is core to NASA's mission.

Ms. Carol Ramsey asked how they know if what they've chosen to do is having the most impact. The real issue, perhaps, is not the concept or strategy, but implementation. Thousands of wonderful products will crash and burn if the entity providing them cannot implement them. This is an opportunity to determine a different emphasis and create a different tone and set of standards for performance related to NASA materials out in the field. A lot of energy can be lost due to ineffective management. She talked to the Program Office of one of richest foundations, and they said, "If money was the issue, we wouldn't have a problem." Look at gaining leverage on the implementation problem.

Dr. Harriett Jenkins asked approximately how many education initiatives NASA had. Dr. Clifford Houston replied that they had 104 programs funded for \$100,000 or more, with a total of probably about 200 programs. Since NASA has asked them to give attention to the Pathfinder Programs, she was interested in knowing how those programs checked out against NASA's evaluation criteria. She suggested it would be helpful for NASA to hone the questions they want advice on. Dr. Houston replied that, of the programs they evaluated, 7 programs were judged exemplary (receiving scores of 90 out of 100), 84 were in the "good" range, 13 needed improvement. Dr. Jenkins said it seemed that NASA had decided they could best implement programs that help attain NASA's vision and mission and inspire and engage the public by utilizing programs that align with the six operational goals and had shared how they were doing that. She asked if any of the exemplary programs duplicated or augmented the Pathfinder Programs and whether NASA had a strategy for improving or deciding whether to fund the remainder of the programs. Dr. Loston replied that they have been challenged by OMB to strategically align the NASA programs. That is a topic for future

discussion. Merging 17 different entities is a challenge. There was some discussion of priorities for advice and looking at what can be done and what is most important about what is being done.

Thursday, February 19, 2004

Dr. Harvey convened Thursday's meeting with an introduction of committee member Dr. Phillip Clay, MIT Chancellor.

Enterprise Education Leads (cont)

Earth Science Education

Dr. Ming-Ying Wei

Dr. Wei said she represents the Blue Planet. Observing Earth has been part of NASA since the beginning. Under Dr. Ghassem Asrar, who has always had a keen interest in education, Earth observing got more momentum a decade ago. Education was part of that. They are now nine percent of the NASA budget. The education component of the Enterprise has three people. They operate under the first mission goal, to understand and protect the home planet, and draw on the compelling immediacy of the environment of Earth to motivate learning in science and math.

NASA pioneered Earth Science. They currently have 18 satellites on orbit and receive 3 terrabytes of data per day. One-third of the U.S. economy is influenced by natural events. NASA can contribute to real policy decisions in society. They research air and life plus interaction and the time and spatial scale of interactions to predict effects.

They organize their research by six themes:

- weather
- earth surface and interior (monitoring continental drift, floods)
- climate variability and change (el nino)
- carbon cycle and ecosystems (how carbon is stored on land and in the ocean)
- atmospheric composition (ozone hole)
- water and energy cycle

The Sun drives a lot of these cycles, and they work with the Sun-Earth connection folks on research. To teach the basic Earth Science concepts, research departments had to work together and learn that less is more. They work at uncovering how young people can learn without being overwhelmed.

Dr. Wei went over some of their programs. "Classroom of the Future" addresses teacher preparation and is offered on college campuses to pre- and in-service teachers. They have a goal of putting in the smallest amount of effort to leverage the highest amount of education. She presented a chart on the partnerships and technology they use to leverage education. The impact they want to have is, first, interest and understanding and, second, taking action for personal needs or the needs of society. They are working with Mr. Stofan on Explorer Institutes and trying to understand informal education needs and then apply the resources NASA can provide.

In response to a query, Dr. Wei explained the GLOBE program. The program is similar to Explorer Schools. It used to be a joint program of NOAA, NASA and NSF. One year ago, NASA took the lead and NOAA dropped out, leaving NSF. The program is part of the President's management agenda. They recently put out a solicitation for schools. The program has \$5 million for cooperative activities with schools. It provides an opportunity for students to look at data from Earth Science research and satellite observations for analysis in the classroom. North Carolina, Texas, and Alabama have statewide integration. There is also an international component.

Their education budget is \$17 million plus \$8 million in graduate students as part of their research programs, \$5 million in the GLOBE program, \$6 million in K-12 programs, and another \$3 million in data system education projects. They partner with space grant entities that also contribute money.

Space Science Enterprise

Dr. Phillip Sakimoto

Dr. Sakimoto is the acting director for the education and public outreach program for the Space Science Enterprise. Their object of research is simply the Universe and everything in it. They ask such simple questions as: How did the universe begin and evolve? How did life arise? Are we alone?

In Space Science, education and public outreach (E/PO) is allocated one to two percent of each program's budget. They have a total budget of \$35 million. They have a huge array of projects. They have evolved in the last eight years to one of the largest organizations in Space Science E/PO. They have created partnerships between researchers and educators. Educators guide everything they do so it will be useful to them. There are a relatively small number of space scientists, to a large number of educators, so they work to provide opportunities for teachers to participate.

They evaluate their results continually. They use an external advisory group from Leslie University in Cambridge. They also asked their standing Space Science Advisory Committee to do a 5-year implementation evaluation. Because education is embedded in their programs, the content reflects front-line science. They have 115 space science missions and 1,300 scientists contributing to E/PO. He showed a chart listing the number of organizational partners they have in all aspects of the educational community. They have lots of fingers for getting the word out about their programs. In one year, they have had about 2,400 institutions host E/PO activities around the country.

They estimate that their programs touch:

- Workshops: 390,000 participants
- Exhibitions: 3 million
- Internet events: 6 million
- Public media: 200 million

He presented examples of what they are doing. On their Mars rover website, they made a commitment to have everything immediately accessible to the public. The hits on the website have exceeded every record they could find. It is amazing that scientists can put that information out so immediately. They have achieved true public engagement in the exploration of another planet. Many classrooms around the country are analyzing Mars images. Students can do research. In addition, they have a wonderful exhibit on the Mall outside the Capitol that is a scale model of the solar system. They support the PBS series "Passport to Knowledge."

On the issue of diversity, they have worked to build Space Science capabilities at minority universities. They had a solicitation three years ago (50 universities) to build facilities that make sense to that campus. Over the last three years, they have had 10 collaborations with NASA missions, 50 working partnerships with major space science research groups, instigated 25 new faculty positions, 12 new degree programs, and 68 new courses (1,800 students) in Space Science. They partner with people who do education for a living.

In addition, to address minority scientists scattered throughout the country, they held an experimental meeting in June 2003 in Chicago to bring together 300 minority scientists who wanted access to Space Science research programs with currently funded scientists. They gave them lots of time to meet each other and pass on what it takes to participate in NASA programs. They believe in building partners. They hope the interactions will grow into collaborations.

In response to a question about what their two independent evaluations said about their programs, Dr. Sakimoto said the two reports were very much in synch. The program received accolades for the size, scope, commitment, scientist participation, and working with educators. The suggestions for improvement were to build more coherence into the program. So they have initiated the Space Science Framework project. They are taking the science story they want to tell, overlaying that on national science standards, and tagging it by subject and grade level so teachers can find what NASA has that addresses points in the standard curriculum. They felt they needed to go deeper into the impact of their materials and how teachers are using them.

In response to a question, Dr. Jeffrey Rosendhal, the previous director of E/PO for Space Science, said very little of their budget is spent on evaluation. Probably 5 percent of the budget goes into evaluation, but it is not one piece, but integrated. Evaluation is built into the education programs for them to be competitive. They get peer reviewed right up front. They get review from advisory committees and Headquarters. The Leslie people take a look at the system as a whole. They have asked the Leslie people to look at an ideal evaluation system. It's not about more stuff, but taking greater pains to train teachers how to use materials and support their use.

There is additional money in higher education that is part of the research budget. In general, they attract more outside funding than they spend. He gave the example of a Steve Hawkins IMAX movie they will support with materials, but the millions of dollars are commercial. They focused outward, not inward. They felt NASA was not there to spread the money around. Instead, they took a very strategic look at key entry points. They provide access to the excitement of exploring Mars, and that is priceless. The two Associate Administrators of the Enterprise thought education was important enough to do, first Les Huntress incorporated it into the strategic plan and then Ed Weiler signed up to it. The Space Science Advisory Committee came up with the target one to two percent guideline. They really worked to target the better leverage and entry points to make an impact on a national scale with limited resources and leave footprints. They have products in play that will continue a legacy if they get wiped out tomorrow.

Aeronautics and Exploration Systems Education

Bill Anderson, Manager for Education

The Aerospace Technology office has been reorganized into two Enterprises, the Exploration Enterprise and Aeronautics. He is the education lead for the Office of Aeronautics and Exploration Systems. They have a budget of \$2 million in aerospace. It looks like after the split, he may get \$2 million from each Enterprise.

Exploration is responsible for technology transfer. They have a committee of education officers at five NASA Centers and at Headquarters along with Shelley Canright from Code N that advise the Enterprise.

Their strategic objective in secondary and elementary education is to get a new set of lesson plans out every week that educators can get online and find out how to incorporate into their lesson plans. Their "Earth to Orbit" design challenge focuses on pipeline issues and brings children into engineering. One year, their topic was how to build a heat shield. He told a story about two 5th grade boys who talked with Administrator O'Keefe and eventually Congress about what they learned from one of the NASA education programs. The Aerospace Education Laboratory is mobile truck that demonstrates aeronautics. There are 23 around the country. They have a cable station, an exhibit that goes to professional meetings and air shows.

They participate in e education with:

- Why Files
- NASA Explorers
- Science files
- CD ROMs they pass out to show kids careers they can have in aerospace
- Reliving the Wright way website
- Many Centennial of Flight activities.

Their "Try to fly the Wright flyer" activity brings in math so students can track their progress learning to fly it.

They have a challenge in front of them to develop a plan for new exploration systems enterprise, but rewrite the aeronautics education plan to reflect the objectives of the Office of Education and the President's vision.

Dr. Natalicio noted the materials available to teachers is overwhelming. She asked how they were going to sort it all out or evaluate materials on relative merits? There is a disconnect between the Enterprises and underutilization of the customer because the customer doesn't know the universe is available and NASA has no way to evaluate the products. It would be a huge service to teachers to flag or annotate or make real what might fit within their standards.

Dr. Canright said they have started down that path. They are doing a product evaluation. They wanted to understand the systems of Earth Science and Space Science, which have rigorous systems of evaluation, and settle on a consistent process for evaluation. They would like to take products that are exemplary and metatag it as it gets put onto the NASA Portal. She wants to do a boot camp on how to think about a product and learning technologies. One stop shopping is the hope.

Mr. King asked about NASA robotics outreach program. He hadn't heard anything in awhile. NASA sponsors teams, and makes in-kind contribution, lends professionals. Commercial funders are large investors. NASA seed money was helpful in St. Lewis. Ms. Ramsey pointed out, while her company supports these programs, they won't serve poor communities. Dr. Rosendahl noted different things wind up targeting different audience. How is the portfolio as a whole doing?

Committee Business

The committee discussed the next meeting scheduled in August and decided Katie Blanding would send out three dates for people to respond to with their availability.

Dr. Loston closed by saying NASA has a wealth of rich resources with over 30,000 inventions and discoveries available to the Nation's teachers. They are trying to get their arms around how they push it out in a systemic, useful manner. She looked forward to the committee's recommendations on how they can best ensure that the pipeline will yield the workforce that NASA needs to grow the Mars generation. How do they inspire this urge for exploration in the classroom? How do they teach the teachers to inspire the students? What more can they do given their new exploration vision.

Dr. Fernandez commented that the NASA materials really make math and science come alive. Any child exposed to those materials would be willing to engage. That is their tomorrow. The issue is how to get the materials to teachers who are so regulated by state requirements in math and science. There was a need for putting everything in one accessible place for teachers to go to and to look at the competencies required for each state and label the products that link up to the state requirements. Not only do NASA and allies need to alert the teaching force to the availability of these materials, but also NASA needs a deeper understanding of the broad teaching force and the utility of their products and quality control of the products. NASA needs to deconstruct this point by point.

Dr. Phillip Clay suggested labeling everything on the web by competency, age, grade, and subject.

Ms. Carol Ramsey focused on access and accessibility. NASA should become the Google of science education information by making access very simple and easy. NASA has a tremendous brand. She referred to the book, *The Tipping Point*, on how people look for authoritative sources, which is how NASA should position itself through facilitated access and reliable materials. So the taxonomy of the products available has to match the teacher's world.

Another member suggested the importance of convening minority scientists to expose them to what's available and to build a capability for people to use what NASA is producing. Offer support to answer questions. Promote products during visits to minority institutions and in the processes for research grants and fellowships.

Ms. Senta Raizen added it would be nice to know where else the material has this been used and what the results were. That would help teachers know whether it fits their content and whether they can expect good results. NASA might also indicate what training is available for instructors who feel uncomfortable with the materials. There are 49 very different state standards. NASA needs "points of light" in each state to translate their materials.

Dr. Loston said NASA has Aerospace Education Services Program specialists in each state. They can be added to the database as resource people.

Dr. Natalicio pointed out that in the range of teachers the least well prepared will be in minority schools. Many of these teachers are transient and not necessarily committed to teaching or their materials. One of challenges is to reach those children and create systems that would push this into those environments and give access to students independently. The assumption is that the teacher is able to take the product into the classroom. How does NASA help the students least well served by the educational system in general? Technology may be the only scaleable way to get out there, but there are still schools that don't have computers.

Dr. Loston said NASA has a partnership agreement with the National Guard, which has an independent network in every state. Dr. Canright added they are looking at technologies that kids have—hand-helds, cell phones—not just the web.

Mr. King observed that it took a day and a half for them to hear about the resources available to teachers and after school educators. Whenever someone encounters the NASA system, there is a need to make the big picture more available. Exhibits in the museums could connect with scholarship programs.

Center E/PO programs are another piece that the committee did not hear about. Center directors have discretion over that funding. That is information that could be available on the website as well.

Dr. Gerald “Carty” Monette was impressed with work the new Enterprise was charged with and was doing. At the risk of offending his traditional tribal members, he said the committee meeting was like a pow wow—for celebration but also for tribal clans to come together. The tribes make decisions for the larger society about providing food, protection, leading the people. Pow wows bring the clans together and then they sit as elders, wise people to advise and guide. It is a healthy challenge before the committee. He hadn’t heard any negative comments from new comers or those trying to bring things together. That’s a real plus. They have heard statements that things not perfect, but all is going forward. His concern in particular is Native Americans. But he is also concerned about rural, isolated, and poor areas of America. There are a lot of children out there in that gap. Not only is there a lack of educational achievement, but also commercial and economic success. So he will try to speak for rural folks as well. Last year they collected data on three middle schools on the reservation. In the 8th grade, not one of those schools—with a total of 2,300 children—had algebra. There was no upper level math in high school. Achievement scores on the reservation are way below the national average. It is similar for rural America. Three of the reservation schools are in corrective action as defined by No Child Left Behind. So he will go back to a community where all these factors are present in addition to a high level of poverty and different cultural aspects of the community. In our journey to reach to space, he felt the community needed to keep in mind that all Americans need to enjoy access to these materials. It might mean changing focus in some to allow access to poorer places in the country. The Nation cannot leave anybody behind. That’s the charge. He wants to offer solutions, but he needs to know the problems.

Ms. Ramsey admonished herself for sometimes taking things for granted. She wondered how much understanding there was about the situation in poor, rural areas. That perspective needed to be heard, probably a lot, to remind them to make materials accessible there.

Dr. Raizen said it came back to making materials effective in their context. That information needs to be developed if it is not available. Dr. Loston said there were bodies of educational research on generational, geographical, economical, cultural differences, and student attitudes. NASA attempted to enjoin different professional organizations for advice. Over 80 partners representing various organizations supported them. As far as asking the students, Dr. Canright offered that they went to students to test their website edspace.nasa.gov and polled them on Mars. They are taking last year’s “NASA Connect” program materials and making them more sensitive to tribal schools.

Dr. Fernandes thanked Carty for the reality check. She has sat on one advisory group where she felt really good when she walked away because it made a difference. They published a document for schools to perform or perish that was such a powerful document that it closed schools down. She wants to be able to make a difference.

Dr. Harvey reiterated the disjunction in the quality of education in different schools. NASA needs to get the materials in a student-friendly context to promote independent learning.

Dr. Loston reminded the committee their two priorities were the pipeline and the workforce.

Dr. Natalicio characterized the elements of the discussion about outreach and public knowledge of science, or science literacy, and about educational outcomes in terms of number of hits on a website, etc. Measuring educational outcomes is very different and not evident in the discussion. She felt there was a real opportunity for NASA to partner with contractors and do work study programs to leverage resources. That would not only teach about science, but also then make the link, particularly for students thrilled about high tech, to understand space in a career context, which would make it more likely they would join the NASA workforce. They have the Storefront Program where university computer science students work for Lockheed on campus doing real work. They move into careers with Lockheed.

Dr. Harvey felt the discussion needed more focus and requested that committee members over the next couple of weeks (February 20 to March 5) send Katie Blanding, the executive secretary, three or four considerations they thought were the most important. He will use that as the basis for setting the agenda for the next meeting.

APPENDIX A
AGENDA
NASA EDUCATION ADVISORY COMMITTEE MEETING
NASA Headquarters
MIC-6 (6H46)
Washington, D.C.
February 18-19, 2004

Wednesday, February 18, 2004

8:30-8:35	Welcome	Dr. Adena Williams Loston <i>Associate Administrator for Education</i> Dr. William Harvey <i>Education Advisory Committee Chairman</i>
8:35-8:50	NASA Deputy Administrator Remarks	Mr. Frederick D. Gregory <i>Deputy Administrator</i>
8:50-9:30	Introductions and Chair's Review of Agenda	Dr. William Harvey
9:30-10:00	Federal Advisory Committee Act Overview	Mr. Andrew Falcon
10:00-10:30	Federal Ethics Rules	Mr. Andrew Falcon
10:30-10:45	Break	
10:45-12:15	Overview of the NASA Education Enterprise and Strategy	Dr. Adena Williams Loston
12:15-1:15	Lunch	
1:15-2:35	Overview of Education Programs	Dr. Clifford Houston, <i>Deputy Associate Administrator for Education Programs</i>
1:15-1:35	Elementary and Secondary Education	Dr. Bernice Alston
1:35-1:55	Higher Education	Dr. Brad Weiner
1:55-2:15	Education Technology & Products	Dr. Shelley Canright
2:15-2:35	Informal Education	Mr. James Stofan
2:35-2:50	Break	
2:50-3:10	Overview of Education Programs (Cont)	
2:50-3:10	Flight Projects	Ms. Debbie Brown Biggs
3:10-3:50	Enterprise Leads' Reports	
3:10-3:30	Space Flight Education	Ms. Debbie Brown Biggs
3:30-3:50	Biological & Physical Research Education	Ms. Bonnie McClain
3:50-4:00	Break	
4:00-5:30	Q&A/Open Discussion	Dr. Adena Williams Loston
5:30	ADJOURNMENT	

Thursday, February 19, 2004

8:30am	COMMITTEE CONVENES	Dr. William Harvey
8:30-9:30	Enterprise Leads' Reports (Continued)	
8:30-8:50	Earth Science Education	Dr. Ming Ying Wei
8:50-9:10	Space Science Education	Dr. Philip Sakimoto
9:10-9:30	Aeronautics and Exploration Systems Education	Mr. William Anderson
9:30-9:40	Public Affairs/Education Outreach	Ms. Gretchen Cook-Anderson
9:40-9:50	Break	
9:50-11:00	Closing Remarks	Dr. William Harvey Dr. Adena Williams Loston
11:00	ADJOURNMENT	
11:00-2:00	Administrative Session (Closed to the public)	Dr. William Harvey
	Working Lunch: Review of Issues and Findings Develop Committee Work Plan	

APPENDIX B

ATTENDEES

Committee Members

William B. Harvey, Chair
Phillip L. Clay
Dolores Fernandez
Harriett G. Jenkins
John Jordan
Douglas King
Gerald “Carty” Monette
Diana Natalicio
Senta A. Raizen
Carol Ramsey
Lee Stiff

American Council on Education
Massachusetts Institute of Technology
Hostos Community College of the City of New York
Consultant
Mississippi Department of Education
St. Louis Science Center
Turtle Mountain Community College
University of Texas at El Paso
National Center for Improving Science Education
Raytheon
North Carolina State University

NASA Attendees

Kim Allen
Bill Anderson
Bernice Alston
Debbie Biggs
Katie Blanding
Shelley Canright
Barbara Cherry
Gretchen Cook-Anderson
Patty Currier
Andrew Falcon
Rebecca Gilchrist
Fred Gregory
Clifford Houston
Adena Williams Loston
Bonnie McClain
Garvey McIntosh
Mei Mei Peng
Jeffrey Rosendhal
Philip Sakimoto
Frank Szofran
Katie Spear
Jim Stofan
W. Y. Wei
Brad Weiner

[illegible]

Other Attendees

Sarah Brezniak
Peter Henderson
Joanne Hopkins
Marie McDemmond
Linda Voss

Consultant – Outstart
National Academy of Sciences
SRI International
Norfolk State University
Consultant

APPENDIX C
LIST OF PRESENTATION MATERIAL¹

Presentations

- 1) FACA/Ethic Overview
- 2) Education Enterprise Overview
- 3) Public Affairs and Education Division
- 4) Elementary and Secondary Education Division
- 5) Higher Education Division
- 6) Education Technology & Products
- 7) Informal Education Division
- 8) Education Flight Projects
- 9) Space Flight Education
- 10) Biological and Physical Research Education
- 11) Earth Science Education
- 12) Space Science Education
- 13) Aeronautics Enterprise and Exploration Systems Enterprise Education

Other

1. Charter of the Education Advisory Committee of the NASA Advisory Council
2. A Renewed Spirit of Discovery: The President's Vision for U.S. Space Exploration
3. President Bush's vision speech
4. The Vision for Space Exploration, February 2004
5. The Science and Engineering Workforce: Realizing American's Potential, National Science Board, National Science Foundation, August 14, 2003.
6. Education Enterprise Strategy
7. NASA Office of Education CD
8. Understanding & Protection Our Home Planet, Earth System Science
9. Spinoff 2003: 100 Years of Powered Flight
10. Innovation magazine, Fall 2003

¹ Presentation and other materials distributed at the meeting are on file at NASA Headquarters, Code N, Washington, D.C. 20546.